

OUTLINE SHEET 1-2-1

Basic Safety

A. Introduction

The shipboard environment is comparable to working in heavy industry with the added elements of high seas and combat situations. The practice of basic safety is a must in order to minimize casualties.

B. Enabling Objectives

- 1.4 **DESCRIBE** basic safety precautions that are specifically related to the engineering department.
- 1.5 **DESCRIBE** the safety procedures when lifting objects.
- 1.6 **EXPLAIN** the procedures for reporting safety hazards.

C. Topic Outline

- 1. Introduction
- 2. Overview
- 3. Navy Occupational and Health Program
- 4. Lifting Heavy Objects
- 5. Reporting a Safety Hazard
- 6. Summary and Review
- 7. Assignment

ASSIGNMENT SHEET 1-2-2
Basic Safety

A. Introduction

This material is to be used as a review for the material covered in class.

B. Enabling Objectives

Refer to enabling objectives in Outline Sheet 1-2-1.

C. Study Assignment

1. Read Information Sheet 1-2-3

D. Study Questions

1. Why is the risk of electrical shock greater onboard a ship than on shore?
2. What must be done prior to entering a space that is normally unmanned?
3. What must you do when you see an unsafe or unhealthy working condition?

INFORMATION SHEET 1-2-3

Basic Safety

A. Introduction

This information describes basic safety applicable to shipboard engineers.

B. Reference

OPNAVINST 5100.19C

C. Information

I. The Navy Occupational Safety and Health Program (NAVOSH) is used to enhance operational readiness and mission accomplishments.

A. It establishes safety and health programs designed to reduce occupational injuries, illnesses or deaths, and material loss or damage. It is primarily concerned with:

1. Occupational safety - elimination or control of hazards that can result in immediate injury or death.
2. Occupational health - identification and elimination of the adverse health effects of exposure to chemical, physical, and biological agents.

B. It provides the guidelines for Major Hazard-Specific Programs such as:

1. Asbestos Control
2. Heat Stress
3. Hazardous Material Control and Management
4. Hearing Conservation
5. Sight Protection
6. Respiratory Protection
7. Gas Free Engineering
8. Electrical Safety
9. Radiation Protection
10. Lead Control
11. Tag Out Program
12. Personal Protective Clothing and Equipment
13. Mercury Control
14. Man-made Vitreous(glass) Fibers

C. Specific instructions and procedures pertaining to safety are contained in publications such as the NAVOSH Program Manual OPNAVINST 5100.19 (series).

II. There are certain hazards inherent to the operation and maintenance of the engineering plant. Basic safety precautions help minimize, if not entirely eliminate, the dangers posed by these hazards.

- A. Asbestos is a fibrous mineral.
 1. It can be produced into a fireproof material that possesses high tensile strength, good heat and electrical insulating capabilities, and moderate to good chemical resistance.
 2. Because of these characteristics, asbestos has been used as:
 - a) Thermal and acoustical insulation
 - b) Pipe lagging
 - c) Gaskets
 - d) Brake and clutch linings
 - e) Floor and roofing materials
 3. Before 1971, most of the thermal insulation used on Navy ships was asbestos.
 - a) Asbestos insulation and other asbestos-containing materials are normally not a health hazard when in good condition.
 - b) Exposure to airborne asbestos fibers has been shown to cause lung cancer.
 - c) The only prevention is by eliminating exposure to asbestos fibers.
 4. Ships commissioned or that have had insulation replaced after 1974 started using non-asbestos thermal insulation.
 - a) It is not possible to identify asbestos based solely on a visual inspection, however, ships have used red tinted thermal insulation to mark non-asbestos insulation.
 - b) If you have any doubt to whether a material contains asbestos, contact your immediate supervisor.
- B. Various fibers used aboard ships bear some chemical and hazardous characteristics similar to asbestos minerals.
 1. Man-made vitreous(glass) fibers(MMVF), also referred to as man-made mineral fibers, are derived from :
 - a) Rock
 - b) Clay
 - c) Slag
 - d) Glass
 2. These man-made fibers have replaced asbestos as the primary source of insulation and lagging material.
 3. Because these materials are fibrous and bear some chemical and physical similarities to asbestos minerals, some materials may have a similar health hazard potential.
- C. The machinery and piping in the engineering spaces produces large amounts of heat.
 1. The temperature in machinery spaces may sometimes reach over a hundred degrees.

2. The surfaces of machinery and piping may be extremely hot, especially piping easily identified by its aluminum paint.
3. Shipboard fires can produce enough heat to melt the steel deck and bulkheads.
 - a) CNT(Certified Navy Twill) uniforms and Corfam shoes may only be used for ceremonial purposes.
 - (1) CNT uniforms are much more likely to catch fire than the regular cotton uniform.
 - (2) Corfam shoes are known to melt when worn on hot decks.
 - b) Only cotton type uniforms or fire retardant coveralls may be worn while inside machinery spaces.
- D. Many of the substances used in the maintenance and operations of ships are inherently hazardous both to the person using them and to the environment.
 1. Hazardous materials can be used safely as long as all the instructions, safety precautions, and warnings are complied with. Hazardous material labels are used to indicate hazards associated with the material.
 2. Always read the instructions that come with the materials.
 3. Ask your supervisor if you have any questions about the materials that you are using.
- E. The noise level found in machinery spaces and other hazardous noise areas are high enough to produce permanent hearing loss to personnel exposed to it for prolonged periods.
 1. Hazardous noise areas are clearly marked with orange or yellow warning signs.
 2. Personnel working or entering designated hazardous noise areas must use the required hearing protection.
- F. Various duties you will be assigned to do have the potential to be dangerous unless you use the proper safety equipment.
 1. Crew members must wear appropriate eye protection when performing eye hazardous operations such as:
 - a) Cutting or welding
 - b) Drilling
 - c) Grinding
 - d) Milling
 - e) Chipping
 - f) Sand blasting
 - g) Pouring or handling corrosive liquid
 2. Devices for eye protection shall be selected using guidance provided by the NAVOSH Program Manual.
 - a) Safety glasses
 - b) Chipper's goggles
 - c) Welders goggles
 - d) Chemical goggles

- e) Face shields
- 3. Your ship will have eyewash units and/or emergency showers installed in all areas where crew members may be exposed to corrosive materials.
 - a) Eyewash stations will be marked with a green sign with white lettering.
- G. Many repairs and maintenance operations generate air contaminants that are dangerous if inhaled. Some spaces may not contain enough oxygen to support life.
 - 1. Proper respiratory protection devices will be worn when working:
 - a) in poorly ventilated spaces
 - b) with any hazardous material that emits noxious gases such as paints or solvents.
 - 2. There are two basic types of respiratory protection:
 - a) Air-purifying respirator - removes air contaminants by filtering or absorbing them as the air passes through the cartridge. This type of respirator will not support life in oxygen deficient atmosphere.
 - b) Atmosphere-supplying respirator - used when the contaminant's concentration is too high to use air-purifying respirators or when there is not enough oxygen present in the compartment to support life.
 - 3. Before entering a tank, void, or space not normally manned,:
 - a) notify Department Head or Division Officer.
 - b) verify the space was checked by a Gas Free Engineer.
 - c) ensure a safety observer is posted (monitoring the work from outside the space).
 - d) comply with Gas Free Engineering certificate posted outside the space.
 - 4. No routine hazards, except for ordinance, are as dangerous as the presence of potentially lethal atmospheres in ships' spaces. For this reason, certain spaces must be gas-free certified by a gas free engineer prior to entry.
- H. Electrical hazards on board ship.
 - 1. Electrical hazards are always present on board a ship due to the following factors:
 - a) High humidity
 - b) Metal structures
 - c) High voltage electricity
 - d) Perspiration
 - 2. Even very small levels of current (less than 1 amp) may be hazardous or fatal. An ordinary lighting circuit may have as much as 10 to 12 amps of current.

3. All personal portable electrical equipment must be electrically safety checked prior to use.
4. Personally owned or non-Navy-standard equipment is prohibited from being introduced and used onboard ship. Some examples are:
 - a) Fans
 - b) Personal extension cords
 - c) High-intensity lamps
 - d) Plugged-in reading lamps
 - e) Electric blankets
 - f) Heating pads
 - g) Personal electric power tools
 - h) Heat/sun lamps
 - i) Hot plates and griddles
 - j) Microwave ovens
 - k) Electric heaters
 - l) Portable refrigerators
 - m) Portable air conditioners
 - n) Immersion-type water heaters
- I. Potentially hazardous sources of radiation exist aboard Navy ships.
 1. Radiation is the energy transmitted through space as electromagnetic waves(rays) or nuclear particles.
 2. Two types of radiation exist - Ionizing and Non-ionizing.
 - a) Sources of Ionizing radiation are:
 - (1) Radioactive material
 - (2) X-ray generating equipment
 - b) Sources of Non-Ionizing radiation are:
 - (1) Lasers
 - (2) Radars
 - (3) Communication equipment (ship antennas)
 3. Radar and communications equipment (transmitters) may emit hazardous levels of radio frequency/ microwave radiation.
 4. Radio Frequency Radiation(RFR) warning signs are posted at all access points to areas where the RFR levels may exceed safe exposure.
- J. Lead hazards onboard ship.
 1. Lead is a health hazard that may adversely affect:
 - a) The peripheral and central nervous systems
 - b) Red blood cells
 - c) Kidneys
 - d) Reproductive systems
 2. During the removal of lead paint, dust hazard is a special problem associated with the methods we use to remove the paint.

- a) Sanding or grinding with electric or pneumatic tools generates more airborne exposure than the use of a chipping hammer followed by sanding.
 - 3. To minimize exposure potential:
 - a) All hot work on lead surfaces should be isolated from all other operations.
 - b) Local exhaust ventilation is almost always required.
 - c) Personnel engaged in the handling of lead or in a situation where the concentration of airborne particles is likely to exceed the permissible exposure limit shall wear protective clothing.
 - d) Use proper respiratory protection as required.
 - 4. Warning signs will be displayed at each location where airborne lead concentrations may exceed the permissible exposure limit.
- K. To prevent injury to personnel and damage to equipment, the Tag-out program is mandatory for all shipboard equipment, components, and systems.
 - 1. The Tag-out procedure consists of a series of tags or adhesive labels that are applied to instruments, gauges, valves, or meters to indicate that they are inoperative, restricted use, or out of calibration.
 - 2. A tag is not to be removed without permission of the authorizing officer, and only after being cleared following the command approved procedures.
 - 3. Tag-outs must never be ignored, bypassed, or defeated.
 - 4. If any system or portion of a system has more than one type of tag or sticker, the Danger (red) tag shall take precedence over all other tags or stickers.
- L. Personal protective devices provide a last line of defense against workplace hazards. Any personal protective equipment breakdown, failure, or misuse immediately exposes the wearer to the hazard.
 - 1. Personal protective devices consist of various types:
 - a) Head protection
 - b) Foot protection
 - c) Hand protection
 - d) Safety clothing
 - e) Personal fall protection devices
 - f) Personal flotation devices
- M. Mercury is a hazardous material that can cause nerve damage. It represents potential personnel hazard if:
 - 1. ingested
 - 2. absorbed through the skin
 - 3. inhaled
- N. Most machinery has moving parts which may expose personnel to possible injury.

1. Personnel must observe the safety precautions to be followed and adhere to the standard operating procedures for individual machine or ship system operations.
 - a) Wear proper protective clothing(i.e., Hearing protection, eye, hand, and foot)
 - b) Hazards exist from rotating machinery when wearing loose fitting clothing, jewelry or neck ties while operating equipment.
 - c) Ensure that equipment is de-energized and properly tagged out of service before attempting to perform repairs or maintenance.
 - d) Ensure all shaft guards, coupling guards, deck plates, handrails, flange shield, and other protective devices are properly installed.
 - e) Do not bypass any safety devices, alarms or sensors.
 - O. Many systems aboard ships use liquids and gasses under extreme pressure. Caution must be used when working with these fluids so you will not hurt yourself or anyone else.
 1. Do not use compressed air to clean personnel or clothing or to perform general space clean up in lieu of vacuuming or sweeping.
 - a) Compressed air may be used to clean machinery parts that have been properly disassembled provided the supply air pressure does not exceed 30 psi and a proper safety shield tip is used. A face shield must be worn while using compressed air to clean machinery parts.
 - P. Ships, especially smaller ones, will pitch and roll heavily during rough weather. Anything not tied down can become a missile hazard.
- III. Lifting Heavy Objects
- A. When lifting a heavy or bulky object,:
 1. crouch close to the load.
 2. get a good grip on the object.
 3. lift with your arm and leg muscles.
 4. keep your back as near to vertical as possible.
 - B. If needed, get someone else to help or use some kind of mechanical advantage (i.e., chain hoist).
- IV. Suspended loads
- A. Wear all appropriate safety gear (i.e., hard hats, safety shoes.)
 - B. When working with suspended loads, always maintain positive control, preferably using tending lines.
 - C. Avoid staying directly beneath the suspended load.
- V. Safety barriers are used to prevent personnel from falling or getting into an unsafe area.

- A. Removal of any safety rails or lifelines requires the authorization of the Commanding Officer.
 - B. Never hang or secure any weight or line to any life line.
 - C. Lifelines are not designed for leaning against.
- VI. Vertical ladders onboard ships pose an unusual safety hazard due to their steep incline and the movement of the ship.
 - A. Never dismantle or remove any inclined or vertical ladders without the permission of the Commanding Officer through your supervisor.
 - 1. If removed, such areas shall be secured with temporary safety lines with warning signs posted.
 - B. When transiting a ladder while carrying any load, make sure you keep one hand on the safety rails.
- VII. Reporting a safety hazard
 - A. All hands should report any unsafe or unhealthy working conditions, mishaps and near mishaps to their immediate supervisor as soon as possible.
 - 1. An unsafe condition is a condition that can cause death, injury, occupational illness, or damage to or loss of equipment or property.
 - 2. A mishap is any unplanned or unexpected event causing personnel injury, occupational illness, death, or material loss or damage or an explosion of any kind whether damage occurs or not.
 - 3. A near mishap is an act or event in which injury or damage was avoided merely by chance.
 - B. If you are not satisfied with the action being taken. You may submit a written report of the unsafe condition on a Safety Hazard Report.
 - 1. The reporting person may stay anonymous.
 - 2. An interim or final response should be completed within 10 days.
 - C. If the originator remains dissatisfied after discussing the matter with the Safety Officer, they have the right to appeal to the C.O.